CA2ON
EVR100
1976
W16

Environment
[Regional Operations Division]

WATER QUALITY AND QUANTITY SURVEY

McFARLANE LAKE AND RICHARD LAKE AREA

CITY OF SUDBURY

January 1976

ONTARIO LEGISLATIVE LIBRARY
TORONTO
APR 17 1990
RECEIVED

Ministry
of the
Environment
Ontario

R. E. Moore,
Director
North Eastern Region

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca

CA2ON
EVR100
1976
W16

WATER QUALITY AND QUANTITY SURVEY

McFARLANE LAKE AND RICHARD LAKE AREA

CITY OF SUDBURY

JANUARY 1976

Prepared by: Municipal & Private Abatement
Ministry of the Environment

TABLE OF CONTENTS

Page

Summary 1

General 3

Location 3
History 3
Topography 3
Survey Procedure 4

Sanitary Waste Disposal 5

Water Supply 6

Conclusions 8

Recommendation 9

Appendices 10

A. Map of Area Surveyed 10
B. Analytical Results 11
Table 1 Analytical Results for Bacteria and Nitrate 11
Table 11 Chemical Analyses 18
C. Sample Questionnaire 20

Glossary

SUMMARY

The Council of the Regional Municipality of Sudbury passed a resolution requesting that the Ministry of the Environment install communal water and sewer services in the Richard and McFarlane Lake areas. As a result of this request, a water quality and quantity survey was carried out by members of the Municipal & Private Abatement staff of this Ministry from August 13 to 17, 1975. The area sampled consists of unserviced portions of the City of Sudbury, south and east from Algonquin Road to Richard Lake. The objective of the survey was to determine if ground or surface water supplies are impaired to the degree that communal services should be installed and/or whether there is an adequate quantity of potable water available to the residents.

No previous survey results were available for the sampled area, with the exception of the McFarlane Lake Preliminary Pollution Study, published in 1973 by this Ministry.

The survey was conducted at a time of minimual precipitation (July: average 1.41", normal 3.27"; August: average 0.86", normal 2.93") therefore resulting in no surface water in drainage ditches and some dug wells going dry. Samples were obtained from approximately every 4th residence and analyzed for bacteriological quality and nitrate concentration. Water samples were also obtained from approximately every 7th residence and analyzed for chemical concentration. A questionnaire (see Appendix C) was completed at every sampling location to determine if problems existed with either water supplies or sewage disposal.

It was ascertained that out of 105 water supplies sampled, 6 had nitrate levels over the permissible criterion of 10 mg/l, and 9 supplies had coliform bacteria counts. Four residents, out of the 105 questioned, complained of wells becoming dry during periods of slight or no precipitation. Of the 30 samples randomly taken for additional chemical analysis, 25 samples indicated a problem with iron (as Fe). All the water supplies affected by iron consisted of dug wells while drilled wells had a much better quality.

The problems encountered may be rectified on an individual basis. The wells which did not provide an adequate quantity of water could be drilled to a suitable aquifer. The iron may be rectified on an individual basis by treatment or the installation of a drilled well to a more suitable source.

No problems with individual sewage disposal systems were encountered at the time of the survey. These results could be attributed to the season of low precipitation.

The water quality and quantity survey carried out in the southeastern portion of the City of Sudbury generally does not appear to indicate impairment of water supplies. It is recommended that a communal water and sewer system is not warranted.

GENERAL

Location

The area of the study is entirely within Broder and Dill Twps. and includes: the subdivisions along Algonquin Road; the subdivisions south of Latimer Street past the existing sewer and water connections; the development at the intersection of the Sudbury bypass and Hwy. 69; and localized areas of development near McFarlane and Richard Lake (refer to Appendix A). Main access to the areas is by Hwy. 69S.

History

The area was first settled as small farms with a few dwellings along Hwy. 69S. A few summer residences were established on Richard Lake and McFarlane Lake. In later years, individual subdivisions were established and expanded. Some small industries are located in the area along with the Ontario Government complex at McFarlane Lake. In 1971 the then Ministry of Treasury, Economics and Intergovernmental Affairs established a Minister's zoning order to control development in the area. In 1973, the area was included in the City of Sudbury when Regional Government was established.

Topography

The general topography of the survey area consists of primarily flat clay land between Richard Lake and McFarlane Lake with rock and gravel hills surrounding the lakes. The remainder of the area, located to the northwest of the lakes, also contains soil of a clay nature with some gravel deposits.

Survey Procedure

Water samples were collected and questionnaires (see Appendix C) completed at 105 sampling locations throughout the survey area which represent approximately 25% of the total number of residences. All water samples collected were analyzed for bacteriological and nitrate quality chemical analyses were undertaken for approximately half of the samples collected (14% of the total number of residences).

SANITARY WASTE DISPOSAL

Existing services within the survey area consist of septic tanks and leaching beds ranging in age up to 20 years. The majority of the septic tank systems were installed in accordance with the guidelines of approval authorities.

During the time of the survey, the weather was unusually dry and warm. This condition had been in effect for several weeks before the survey, resulting in no surface water in the drainage ditches or in the field bed areas. Therefore no samples were collected for analysis.

Questionnaires were collected at each residence where water samples were taken. Review of the questionnaires indicated the septic systems were operating in a satisfactory manner as no problems were mentioned by the residents questioned.

WATER SUPPLY

Existing water services consist of dug or drilled wells. Results of the questionnaire indicated that from the 105 locations visited, 24 obtained water from drilled wells (no problems were reported). Sixty-seven dug wells were sampled with 4 problems of water quantity mentioned and 6 complaints of excessive hardness. A few of the residences utilizing dug well water supplies described a low quantity of water usually occurring during seasons of low precipitation. These problems were confined to dug wells only. Drilled wells adjacent to the sampled dug wells apparently supply amounts of acceptable water. Fourteen residents did not know the source of their water supply. No samples were obtained from lake supplies.

A total of 105 residences' water supplies were sampled. Bacteriological and nitrate samples were taken from each location and 30 were selected at random for chemical analysis, representing approximately 25% of the total residences within the sampling area. The samples were analyzed at the Ministry of Health laboratory, in Sudbury for bacteriological quality and at the Ministry of the Environment laboratories in Toronto for chemical quality.

Results of the analysis indicated that out of the 105 locations sampled 9 indicated slight bacterial contamination and 6 had nitrate levels beyond permissible criterion (see Appendix 3 - Table 1) These samples were located in the Algonquin Road subdivision area. Other chemical analyses showed that all criteria were met in the 30 locations sampled with the exception of iron (as Fe) in which 24 of the 30 locations had levels above the permissible criterion of 0.3 mg/l (note: Appendix A -Table 2). It should be noted however that the 24 samples were all collected from dug well water supplies. The iron problems encountered could be rectified on an individual basis by either relocation of the dug well drilling a new well, or water softening equipment. Other noteworthy results from the chemical results indicate that chlorides (up to 188 mg/l), while within the permissible criterion are somewhat high. Values exceeding 100 mg/l may impart noticeable taste; however, it is not considered a health hazard. This would appear to indicate possible contamination by road salting operations. Hardness results were also slightly high.

Where results of the sampling indicated possible health hazards, warning letters were sent to the residents with an explanation of the results and instructions to contact the Sudbury & District Health Unit for remedial action. The bacteriological problems could be remedied by the chlorination of the individual water supply.

CONCLUSIONS

The results of the survey indicated possible impairment of water quality in only 1 area, which is bounded by Rockwood Drive, Green Valley Drive and Algonquin Road. The results however, only indicate individual problems which are not widespread throughout the particular development. The other sampling locations did not indicate any serious problem other than the presence of iron in dug well supplies. The problem could be rectified on an individual basis by either drilling a well to a more suitable aquifer or the addition of treatment to the existing source of supply.

The installation of communal water and sewer services is not warranted because no significant problems were found to indicate that an adequate supply of potable water of satisfactory quality is not available to the residents. The existing subsurface sewage disposal systems appeared to be operating in a satisfactory manner at the time of the survey and were found to have no adverse effect on ground or surface water supplies.

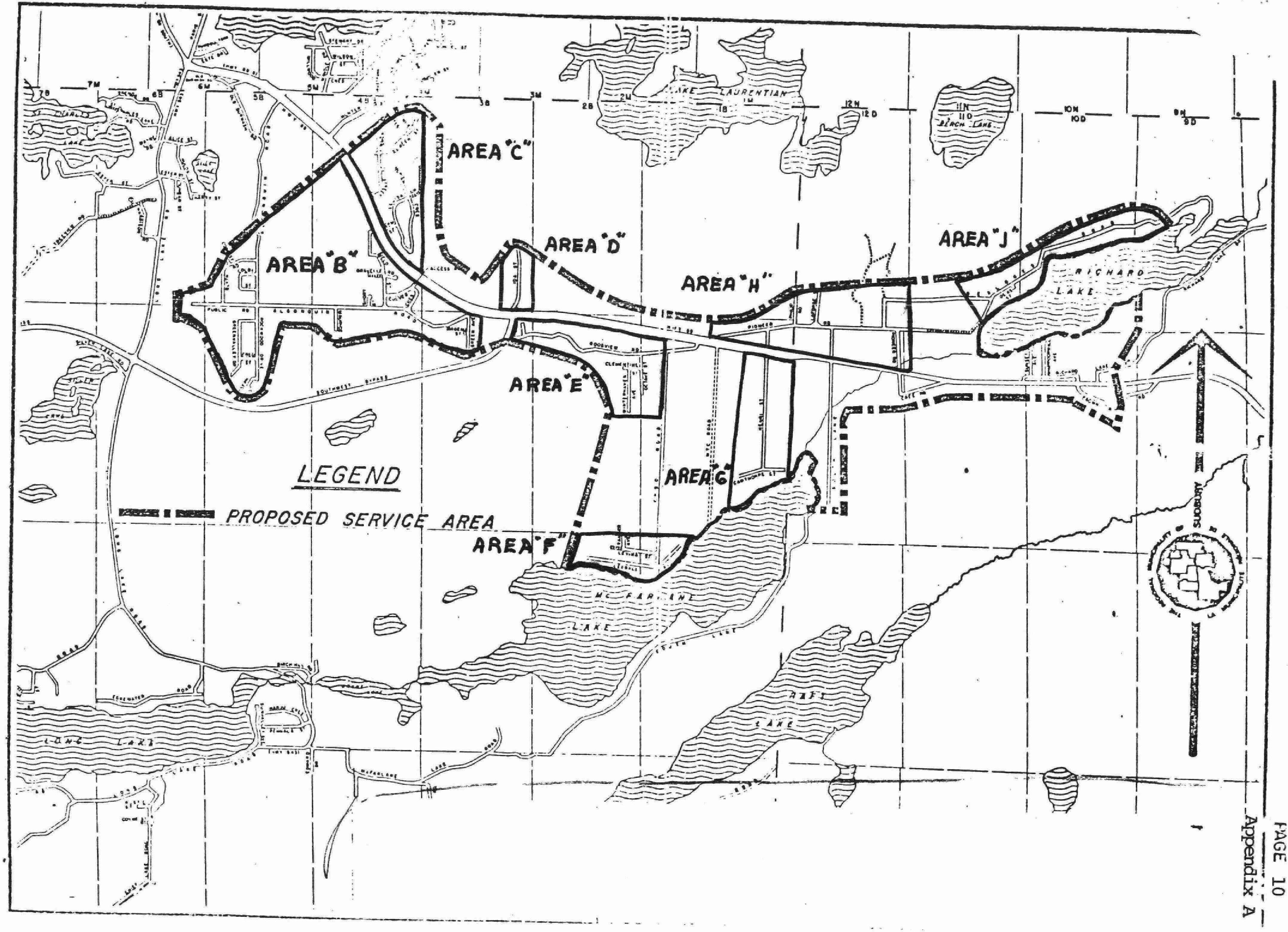
RECOMMENDATION

It is recommended that the provision of communal water and sewage systems not be provided. At those sampling locations where impairment is evident, rectification of the problem may be effected on an individual basis.

Prepared by:

J. G. Bagshaw,
Municipal & Private Abatement.

Map of Area Surveyed



Appendix B"

WATER QUALITY AND QUANTITY SURVEY

McFARLANE LAKE AND RICHARD LAKE AREA

CITY OF SUDBURY

TABLE I

ANALYTICAL RESULTS FOR BACTERIA AND NITRATE

(Aug. 13 - 17, 1975)

rea designation nd Sample No.	Resident's name and address	Type of Well	Nitrate as N(mg/l)	Coliforms per 100 ml Total	Faecal
B-1	M. Zazulak, 2508 Field Street	Dug	<.2	0	0
B-2	P. Dobor, 2593 Field Street	Dug	<.2	0	0
B-3	P. Green, 2608 Field Street	Unknown	<.2	0	0
B-4	R. L. Groves, 2630 Field Street	Dug	<.2	0	0
B-5	J. Lafond, 86 Colby Street	Dug	<.2	0	0
B-6	D. Basich, 107 Colby Street	Dug	<.2	0	0
B-7	J. Mulligan, 2366 Blyth Street	Dug	<.2	0	0
B-8	M. Makitalo, 2377 Blyth Street	Dug	<.2	0	0
B-9	J. Pagnutti, 2659 Rockwood Drive	Dug	22.	0	0
B-10	J. Lengyel, 2631 Green Valley Drive	Dug	<.2	0	0
B-11	G. Fortin, 2690 Green Valley Drive	Unknown	17.	2	0
B-12	B. Lochman, 2733 Green Valley Drive	Dug	<.2	0	0
B-13	J. Gigliotti, 2761 Green Valley Drive	Drilled	<.2	0	0
B-14	W. Saunders, 2778 Green Valley Drive	Dug	<.2	0	0
B-15	J. Martell, 2781 Rockwood Drive	Unknown	1.0	0	0

continued....../2

TABLE I

ANALYTICAL RESULTS FOR BACTERIA AND NITRATE

rea designation and Sample No.	Resident's name and address	Type of Well	Nitrate as N(mg/l)	Coliforms per 100 ml	
				Total	Faecal
B-16	Mr. J. Ritch, 2727 Rockwood Drive	Drilled	5.4	0	0
B-17	J. Moland, 2687 Rockwood Drive	Dug	2.1	0	0
B-18	G. Gray, 2773 Algonquin Road	Unknown	1.2	0	0
B-50	M. Waram, 2690 Muriel Crescent	Drilled	.6	18	0
B-51	J. Marshall, 2814 Algonquin Road	Drilled	3.0	0	0
B-101	J. Kleber, 377 Gravel	Dug	<.2	0	0
B-102	444 Culver Street	Unknown	<.2	0	0
B-103	J. Harriman, 47 Colby Street	Dug	<.2	0	0
B-104	D. Shultis, 131 Colby Street	Dug	<.2	34	0
B-105	2408 Blyth Street	Unknown	<.2	40	14
B-106	I. Regimbal, 2434 Blyth Street	Dug	<.2	0	0
B-107	W. C. Olink, 2498 Blyth Street	Drilled	<.2	0	0
B-108	O. Nykanen, 134 Public Road	Dug	.4	0	0
B-109	M. Myre, 94 Public Road	Drilled	<.2	0	0
B-110	A. Desjardins, 29 Public Road	Dug	12.	0	0
B-111	L. Hallworth, 2726 Algonquin Road	Dug	3.2	0	0

TABLE I

ANALYTICAL RESULTS FOR BACTERIA AND NITRATE

rea designation and Sample No.	Resident's name and address	Type of Well	Nitrate as N(mg/l)	Coliforms per 100 ml	
				Total	Faecal
B-112	2829 Algonquin Road	Dug	<.2	0	0
B-113	J. Law, 2666 Maurice Street	Dug	<.2	0	0
B-114	G. Tait, 2919 Algonquin Road	Dug	24.	0	0
B-115	A. Pauze, 3440 Algonquin Road	Dug	11.	0	0
B-116	J. Jones, 3095 Algonquin Road	Drilled	1.2	0	0
B-117	I. Racicot, 3249 Algonquin Road	Dug	<.2	0	0
B-201	W. Hunt, 406 Gravelle Street	Dug	<.2	0	0
B-202	H. Kalijarvi, 425 Culver Crescent	Unknown	<.2	0	0
B-203	J. Gauchie, 63 Colby Street	Dug	<.2	0	0
B-204	P. Michel, 2409 Blythe Street	Dug	<.2	0	0
B-205	E. Beneteau, 2457 Blythe Street	Unknown	<.2	0	0
C-1	C. Adams, 2214 Louisa Street	Drilled	2.2	0	0
C-2	C. Delvecchio, 2221 Louisa Street	Drilled	2.2	0	0
C-3	J. Onufryk, 2256 Louisa Street	Dug	<.2	0	0
C-4	K. Pedersen, 2281 Louisa Street	Dug	<.2	0	0

continued........../4

TABLE I

ANALYTICAL RESULTS FOR BACTERIA AND NITRATE

Area designation and Sample No.	Resident's name and address	Type of Well	Nitrate as N(mg/l)	Coliforms per 100 ml Total	Faecal
C-5	E. Kilroy, 2373 Louisa Street	Drilled	<.2	0	0
C-20	V. Parrotta, 2251 Muriel Crescent	Unknown	.4	0	0
C-21	J. Berzins, 2312 Muriel Crescent	Drilled	7.6	6	0
C-22	L. Ryan, 2358 Muriel Crescent	Drilled	7.6	6	0
C-52	E. Dennis, 2170 Muriel Crescent	Drilled	.4	0	0
C-53	D. Webster, 2206 Muriel Crescent	Drilled	.4	0	0
C-54	B. Cuseck, 2272 Muriel Crescent	Dug	<.2	0	0
C-55	R. Fera, 2304 Muriel Crescent	Dug	<.2	0	0
C-56	A. Radu, 2026 Armstrong Street	Dug	<.2	0	0
D-6	J. Faulkner, 2548 Ida Street	Drilled	<.2	0	0
D-7	E. R. Blais, 2531 Ida Street	Drilled	<.2	0	0
D-8	D. Mathon, 2499 Ida Street	Dug	<.2	0	0
D-9	J. Ethier, 2471 Ida Street	Dug	<.2	0	0
D-10	J. Bradford, 2476 Ida Street	Unknown	<.2	0	0
E-201	C. Potvin, Goodview Road	Drilled	<.2	0	0

continued......./5

TABLE I

ANALYTICAL RESULTS FOR BACTERIA AND NITRATE

ea designation d Sample No.	Resident's name and address	Type of Well	Nitrate as N(mg/l)	Coliforms per 100 ml Total	Faecal
E-202	E. Collins, Goodview Road	Dug	<.2	0	0
E-203	N. Autime, Goodview Road	Dug	<.2	80	0
E-204	Mrs. Lebeau, Goodview Road	Unknown	<.2	0	0
E-205	R. LeClair, Winterhaven Street	Drilled	<.2	0	0
E-206	V. Renaud, Winterhaven Street	Drilled	<.2	0	0
E-207	G. Porlier, Clemintine Street	Dug	<.2	0	0
E-208	G. Parrot, Octave Street	Drilled	1.6	0	0
E-209	G. Lemoth, Octave Street	Drilled	<.2	0	0
F-1	D. Desjardin, Leedale	Dug	<.2	0	0
F-101	A. Dundas, Leedale Street	Dug	<.2	0	0
F-102	N. J. Williamson, Leedale Street	Unknown	7.0	0	0
F-104	P. Bourque, Leedale Street	Dug	<.2	0	0
F-105	M. Dupre, Leedale Street	Drilled	<.2	0	0
F-106	D. Desjardins, Leedale Street	Dug	<.2	0	0
F-210	R. Seguin, Ranger Street	Unknown	1.4	0	0

continued......./6

TABLE I

ANALYTICAL RESULTS FOR BACTERIA AND NITRATE

Area designation and Sample No.	Resident's name and address	Type of Well	Nitrate as N(mg/l)	Coliforms per 100 ml Total	Faecal
F-211	V. Gosselin, Levina Street	Drilled	.6	0	0
F-212	J. Chillak, Leedale Street	Dug	<.2	0	0
F-213	W. Van Allen, Leedale Street	Dug	<.2	0	0
F-214	A. Moise, Leedale Street	Dug	<.2	0	0
F-215	A. E. Langlade, Leedale Street	Dug	<.2	0	0
F-216	J. Banach, Leedale Street	Dug	<.2	50	0
G-21	L. Keck, Henry Street	Dug	.4	0	0
G-103	R. Favot, Cawthorpe Street	Drilled	<.2	2	0
G-107	M. Stanley, Henri Street	Unknown	<.2	0	0
H-2	Mrs. Tamaricani, Pioneer Road	Dug	<.2	0	0
H-3	K. Burke, Pioneer Road	Dug	<.2	0	0
H-4	Brockdan Hotel, Pioneer Road	Dug	<.2	0	0
H-5	P. Whitherall, Pioneer Road	Dug	<.2	0	0
H-6	G. Barker, Pioneer Road	Dug	<.2	0	0
H-7	V. Potvin, South Lane	Dug	<.2	0	0

continued........../7

TABLE I

ANALYTICAL RESULTS FOR BACTERIA AND NITRATE

ea designation nd Sample No.	Resident's name and address	Type of Well	Nitrate as N(mg/l)	Coliforms per 100 ml	
				Total	Faecal
H-8	School, Pioneer Road	Dug	<.2	0	0
H-9	Church, Pioneer Road	Dug	<.2	0	0
H-10	Pioneer Cosntruction, Philip Street	Dug	<.2	0	0
H-11	G. Smith, South Lane	Dug	<.2	0	0
H-14	B. White, Cree Road	Dug	<.2	0	0
H-15	T. Desormeaux, Cree Road	Dug	<.2	0	0
H-18	B. Mallette, South Lane	Dug	<.2	0	0
J-12	R. Lemieux, Desloges Road	Dug	<.2	0	0
J-13	G. Chrtrand, Desloges Road	Dug	<.2	0	0
J-16	R. Sabourin, Desloges Road	Dug	<.2	0	0
J-17	A. Gancher's, Desloges Road	Dug	<.2	0	0
J-19	C. Ketts, Desloges Road	Dug	<.2	0	0
J-20	J. Zlahtic, Desloges Road	Dug	<.2	0	0

* Area Designation and Sample No.
correspond with Table I.

WATER QUALITY AND QUANTITY SURVEY

McFARLANE LAKE AND RICHARD LAKE AREA

CITY OF SUDBURY

TABLE II

Chemical Analyses

Area Designation and Sample No.		Hardness as $CaCO_3$ mg/l	Alkalinity as $CaCO_3$ mg/l	Iron as Fe mg/l	Chloride as Cl mg/l	pH at Lab.	Apparent Colour Units	Turbidity Units	Cond. µmhos/cm	Type of Well
B-2	P. Dobor	103	84	1.2	31	7.3			300	Dug
B-4	R. Groves	237	76	7.9	99	6.5			610	Dug
B-6	D. Basich	191	135	4.4	15	7.2			410	Dug
B-8	M. Makitado	80	50	.05	2	7.0			185	Dug
B-10	J. Lengyel	169	171	2.2	3	7.3			330	Dug
B-12	B. Lochman	145	146	2.0	1	7.6			275	Dug
B-14	W. Saunders	51	27	.20	10	6.3			137	Dug
B-16	J. Ritch	180	15	.05	112	6.0			570	Drilled
B-50	M. Waram	124	19	.05	11	6.1			335	Drilled
B-101	J. Klebar	378	249	2.2	67	7.5			830	Dug
B-104	D. Shultis	404	317	1.1	22	7.2			770	Dug
B-114	G. Tait	138	3	.15	97	4.9			665	Dug
B-117	I. Racicot	226	84	1.8	92	6.6			540	Dug
B-201	W. Hunt	262	159	.30	65	7.2			620	Dug
B-204	P. Michel	107	69	.75	1	7.6			235	Dug
C-2	C. Delvecchio	74	20	.85	5.9		70	14	250	Dug

continued......../2

TABLE II

CHEMICAL ANALYSES

Area Designation and Sample No.		Hardness as $CaCO_3$ mg/l	Alkalinity as $CaCO_3$ mg/l	Iron as Fe mg/l	Chloride as Cl mg/l	pH at Lab.	Apparent Colour Units	Turbidity Units	Cond. umhos/cm	Type of Well
C-4	K. Pederson	240	82	1.9	134	6.8	150	34	710	Dug
C-19	W. J. Paul	170	92	1.6	43	6.4			420	Dug
C-21	J. Berzins	45	20	.05	2	6.1			112	Drilled
C-52	E. Dennis	56	20	.05	4	6.1			132	Drilled
C-54	B. Cusck	44	25	.25	1	6.7			114	Dug
C-56	A. Radu	62	18	.35	37	7.1			248	Dug
D-6	J. Faulkner	108	74	.05	2	7.2	5	0.45	235	Drilled
D-9	J. Ethier	107	64	.10	32	8.1	5	.40	279	Dug
F-1	D. Desjardins	257	98	1.2	133	7.0			710	Dug
F-101	A. Dundas	46	26	.10	23	7.3			117	Dug
F-105	M. Dupre	62	26	.10	23	7.3			197	Drilled
F-106	D. Desjardins	181	155	1.6	2	7.5			360	Dug
G-103	R. Favot	59	26	.10	23	7.8			200	Drilled
H-5	P. Wintherall	269	106	1.2	140	7.0			740	Dug
H-10	Pioneer Const.	296	117	1.1	153	7.1			800	Dug
H-15	T. Desormeaux	367	157	1.8	188	7.1			970	Dug
J-20	J. Zlahtic	235	89	1.1	120	7.0			650	Dug

SAMPLE QUESTIONNAIRE

Ontario

Ministry of the
Environment

Northeastern
Region

Regency Mall,
469 Bouchard St.,
Sudbury, Ont.
P3E 2K8

SURVEY REPORT FORM

SAMPLE NO. ______________

OWNER	NAME	ADDRESS	PHONE
LESSEE	NAME	ADDRESS	PHONE

WATER SUPPLY	WELL	LAKE	DEPTH & TYPE OF WELL	PROBLEMS

SEWAGE DISPOSAL	TYPE OF SEWAGE DISPOSAL SYSTEM	AGE	PROBLEMS

DISTANCE	SEWAGE SYSTEM TO WELL	SEWAGE SYSTEM TO LAKE	SEWAGE SYSTEM TO LOT LINE	OTHER

REMARKS: (DIAGRAM ON BACK)

SAMPLED BY

____

GLOSSARY

(i) BACTERIOLOGICAL EXAMINATION

Total Coliform Organisms

Total coliform organisms include a wide variety of bacteria ranging from the genus (Group), Escherichia Coli, which originate mainly in the intestines of man and other warm-blooded animals, to the genera Citrobacter and Enterobacter aerogenes. The latter genera are basically found in soil but are also present in faeces in small numbers.

The presence of total coliforms in water may indicate soil runoff or more important, less recent faecal pollution since organisms of the Enterobacter - Citrobacter groups tend to survive longer in water than do members of the Escherichia Coli group, and even multiply when suitable environmental conditions exist.

Faecal Coliform Organisms

The faecal coliform organisms are those coliform bacteria which are all intestinal in origin and usually outnumber all other coliform types in human and animal intestines. Most of the coliform bacteria found by the faecal coliform test are of the gunus Escherichia Coli. However, their death rate outside the warm body is high and accordingly if coliforms present in the water are primarily faecal coliforms, and their number is high, the pollution is probably nearby and recent. Smaller numbers with a high portion of faecal coliforms may indicate nearby pollution with counts reduced by dilution.

Results are reported "coliform count per 100 millilitres".

(ii) CHEMICAL ANALYSIS

Hardness

The total hardness measures the "soap consuming power" of a water due to the presence of metallic cations. The principle components of hardness are calcium and magnesium although a number of heavy metals may contribute to a small extent. The hardest waters are usually encountered in regions with thick top soil layers and extensive limestone deposits.

Hard waters are objectionable because they form insoluble compounds or curds with soap. This substantially reduces the efficiency of washing procedures even when detergents are used. Waters with high hardness are known to cause the formation of a lime scale in plumbing fixtures.

Alkalinity

The alkalinity of the water is generally used to define the buffering capacity or the waters capability to resist a change in pH. This means that if an acidic waste is discharged to a natural water system the effect on the water may not necessarily be detected as a pH change but will be detected as a drop in alkalinity.

Iron

Iron is the most abundant of the heavy metals in nature, but despite this abundance, it is generally found in relatively low levels in natural surface waters. Iron is non-toxic even at high levels but becomes objectionable in water because of the colour and bitter taste it imparts. The water quality objective for Ontario drinking water is 0.3 mg/l as iron.

Chloride

Chloride is a major anion in domestic wastes and in many natural water supplies. Urban runoff often contains high concentrations of chloride in the winter time due to road application of salt.

Chloride poses no direct health hazard, but the water quality objective for domestic water supplies has been specified at 250 mg/l to prevent a salty taste. This salty taste is variable and dependent on the composition of the water. If chloride is present as sodium chloride a detectable taste will be present at 250 mg/l. If chloride is present as calcium or magnesium chlorides, waters containing as much as 1,000 mg/l may not have a noticeable taste.

pH

The Hydrogen Ion concentration in water is measured as pH. Specifically, it is the negative logarithm of the hydrogen ion concentration expressed in moles per litre. Thus, each change of one unit in pH corresponds to a 10 fold change in the hydrogen ion concentration.

Apparent Colour Units

Many lakes and rivers, especially in Northern Ontario, have a characteristic yellowish-brown colour due to the presence of humic acids derived from the decomposition of plants. Lakes of this type are commonly referred to as "acid bog" or "brown water" lakes. A similar colour may also occur when iron and maganese are found in abundance.

Water coloured naturally by humic substances is harmless, but considered unacceptable for drinking purposes because of its appearance. The objective of 5 colour units for domestic water supplies is therefore based on aesthetic rather than on health standards.

Turbidity

The turbidity is a measure of the opticle properties of a sample which causes light to be scattered and adsorbed rather than transmitted in a straight line. Historically, the turbidity was measured using a Jackson candle turbidmeter, but the insensitivity of this instrument lead to the development of secondary techniques which can measure the much lower turbidities commonly encountered in modern water treatment processes.

Specific Conductance

The specific conductance is a measure of a waters capacity to carry an electric current. This property is related to the total concentration of ionized substances in the water. The conductivity of natural waters is mainly due to the presence of calcium, magnesium, sodium, potassium, bicarbonate, chloride, sulphate and nitrate ions.

Specific conductance related quite well to the total dissolved solids concentration. Ontario rivers and lakes free of industrial wastes, have a total dissolved solids concentration generally equal to 0.65 ± 0.10 x the specific conductance.

Nitrate (Nitrogen)

Nitrates are formed via the oxidation of nitrite by autotrophic nitrifying bacteria and represents the most highly oxidized form of nitrogen in the nitrogen cycle. It is generally found at trace levels in all surface waters but may become very high in ground waters as a result of soil leaching.

Nitrates are objectionable because their nutritive properties promote the excessive growth of algae and other aquatic plants. Excessive amounts in drinking water contribute to a disease known as infant methemoglobinemia in which the oxygen carrying capacity of the blood is inhibited. The maximum acceptable level for domestic water supplies in Ontario is 10 mg/l of nitrate as nitrogen in the water if it is to be used for infant feeding. Nitrates are non-toxic to adults.

96936000009487